20

A

NAME Alex Lozupone OFF CL 6L PERIOD 3

## PHYSICS 2 - QUIZ 2

1. The frequency of a sound wave is 440 Hz. If the velocity of sound in air is $3.3 \times 10^2$ meters/second, calculate the wavelength.

$v = f\lambda$

$\lambda = \frac{v}{f}$

$hz = \frac{1}{s}$

$\lambda = \frac{3.3\times10^2 \text{ m/sec}}{440 \text{ 1/sec}} = \frac{330 \text{ m}}{440 \cancel{\text{cycles}}} = .75 \text{ m}$

2. Find the period of the wave in question 1.

$T = \frac{1}{f}$ ✓

$\frac{1}{1/s} = s$

$T = \frac{1}{440 \text{ cycles}} = 2.27 \times 10^{-3}$ s

not cycles

3. A radar signal is reflected from the sun. Assume the distance to the sun from the earth is $1.5 \times 10^8$ kilometers. Calculate the time lapse between sending and receiving.

$v = \frac{s}{t}$

$t = \frac{s}{v}$

~~$t = \frac{(1.5\times10^8)\cdot 2}{3\times10^8}$~~

~~$t = \frac{3\times10^8}{3\times10^8}$~~

$t = \frac{(1.5\times10^8)\times10^3\times2 \text{ m}}{3\times10^8 \text{ m/sec}}$

$t = \frac{3\times10^{11} \text{ sec}}{3\times10^8} = 10^3 \text{ sec}$

or

1000 sec. ✓

| 0 | watt | intens$^{std}$ | dist$^{std}$ | dist$^{unk}$ |
|---|---|---|---|---|
| 1 | 25 | 16cP | | |
| 2 | 40 | | | |
| 3 | 40 | | | |

51,5

59

64.8

u s

$\boxed{15,75}$

22. As a beam of monochromatic light travels from one medium to another of higher refractive index, the wavelength of the light (1) decreases (2) increases (3) remains the same

23. The speed of light changes when light is (1) polarized (2) refracted (3) reflected (4) diffracted

24. A person standing on a straight railroad track hears the whistle of an approaching train. As the train approaches with a constant velocity, the frequency that the person observes for the whistle, compared to the frequency observed by a person riding on the train, is (1) lower (2) higher (3) the same

25. The speed of monochromatic blue light in glass, compared to the speed of monochromatic red light in the same glass, is (1) less (2) greater (3) the same

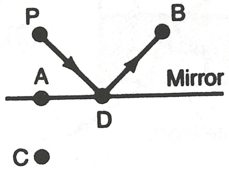
26. A ray of monochromatic light passes from air into water. As the angle of incidence of the light ray increases, the index of refraction of the water (1) decreases (2) increases (3) remains the same

27. As the angle of incidence of a light wave entering glass from air increases, the angle of refraction (1) decreases (2) increases (3) remains the same

28. A ray of light is reflected from a plane mirror. If the angle between the incident and reflected rays is 40°, the angle of incidence is (1) 20° (2) 40° (3) 50° (4) 70°

29. Which wave phenomenon best supports the fact that light travels as a transverse wave? (1) reflection (2) refraction (3) dispersion (4) polarization

30. To an observer at *B*, light rays emitted from point *P* will appear to originate at point (1) *A* (2) *B* (3) *C* (4) *P*



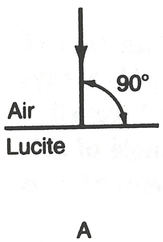
31. When a ray of light strikes a mirror perpendicular to its surface, the angle of reflection will be (1) 0° (2) 45° (3) 60° (4) 90°

32. A light beam from the earth is reflected by an object in space. If the round trip for the beam takes 2.0 seconds, then the distance of the object from earth is (1) $6.7 \times 10^7$ m (2) $1.5 \times 10^8$ m (3) $3.0 \times 10^8$ m (4) $6.0 \times 10^8$ m

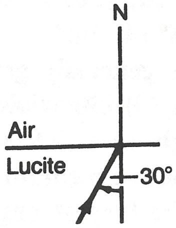
$3.0 \times 10^8$

$\sin \theta m = \sin \theta 2 \; n_2$

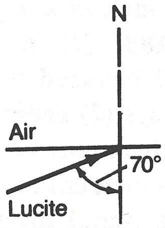
33-36. Base your answers to Questions 33 through 36 on the diagrams below, which show the paths of four rays of monochromatic light as they reach the boundary between two media. *N* is the normal to the surface.



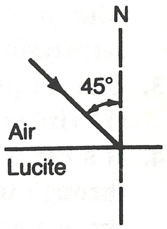
A



B



C



D

33. The direction of the ray of light will not change as the light enters the other medium in diagram (1) *A* (2) *B* (3) *C* (4) *D*

34. The ray of light will undergo total internal reflection at the boundary in diagram (1) *A* (2) *B* (3) *C* (4) *D*

35. The angle of refraction of the ray of light will be greater than the angle of incidence in diagram (1) *A* (2) *B* (3) *C* (4) *D*

36. What is the sine of the angle of refraction for the ray of light in diagram *D*? (1) 1.00 (2) 0.71 (3) 0.47 (4) 0.30

37. The spreading of a wave front into the region behind an obstruction is known as (1) reflection (2) refraction (3) diffraction (4) dispersion

38. As a periodic wave passes into a new medium where the wave speed is greater, the (1) frequency increases (2) frequency decreases (3) wavelength increases (4) wavelength decreases

39. The speed at which light passes through a material medium depends on the (1) frequency of the light only (2) nature of the medium only (3) frequency of the light and the nature of the medium (4) angle of incidence to the medium

40. Which waves require a material medium for transmission? (1) sound waves (2) radio waves (3) x rays (4) visible light

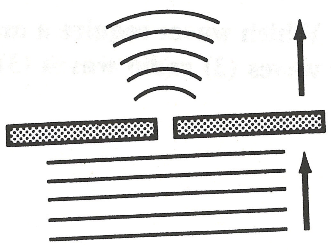
28 NAME Leon Shaulov OFF. CL. 5E PHYSICS 2 - TEST 1 - WAVES

$\frac{c}{\frac{1}{2}}=2$

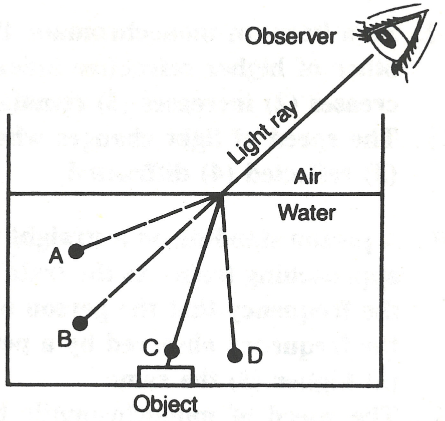
1. If the speed of light in a vacuum is *c*, the speed of light in a medium with an index of refraction of 2 is (1) *c*/2 (2) 2*c* (3) *c*/4 (4) 4*c*
2. A ray of light traveling through water strikes the water-air boundary with an angle of incidence equal to the critical angle. The angle of refraction is (1) 180.° (2) 90.° (3) 45° (4) 30.°
3. The frequency of infrared waves is generally greater than that of (1) visible light rays (2) radio waves (3) ultraviolet waves (4) x rays
4. If a ray of monochromatic yellow light ($\lambda = 5.9 \times 10^{-7}$ m) traveling through the air is incident to a refractive medium at an angle of 30°, the material that would produce the largest angle of refraction is (1) alcohol (2) water (3) glycerol (4) lucite
5. If the speed of light in a medium is $1.5 \times 10^8$ meters per second, the index of refraction of the medium is (1) 0.67 (2) 2.0 (3) 3.0 (4) 2.5

$\frac{3}{1.5}=2$

6. The critical angle for light passing from a special glass into air is 41°. When the angle of incidence equals the critical angle, the angle of refraction will be (1) between 0° and 41° (2) 41° (3) between 41° and 90.° (4) 90.°
7. A beam of light traveling in air is incident upon a glass block. If the angle of refraction is 30.°, the angle of incidence is (1) 0° (2) between 0° and 30.° (3) between 30.° and 90.° (4) 90.°
8. Which type of electromagnetic wave has the highest frequency? (1) radio (2) infrared (3) x ray (4) visible
9. The separation of white light into component colors as it passes through a triangular glass prism is (1) dispersion (2) diffraction (3) diffusion (4) interference
10. When a beam of white light passes obliquely from air into glass, which component experiences the greatest change in direction? (1) red (2) yellow (3) green (4) blue
11. What is the color of light with a wavelength of $6.9 \times 10^{-7}$ meter? (1) blue (2) green (3) yellow (4) red
12. The diagram at the right represents straight wave fronts passing through an opening in a barrier. Which wave phenomenon is exhibited? (1) refraction (2) polarization (3) dispersion (4) diffraction

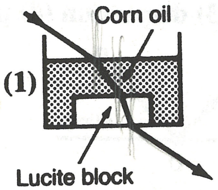


13. An object resting on the bottom of a tank of water as shown in the diagram is being observed. To the observer, the object will appear to be located at point (1) *A* (2) *B* (3) *C* (4) *D*

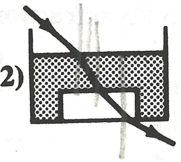


14. Light of a single frequency cannot be (1) dispersed (2) reflected (3) refracted (4) diffracted
15. Which type of wave can be polarized? (1) sound [✓ (2)] light (3) compression (4) any type
16. A wave passes obliquely from a medium having an index of refraction of 1.3 to a different medium. The wave will bend toward the normal in the second medium if its index of refraction is (1) 1.0 (2) 1.2 (3) 1.3 (4) 1.4
17. Which diagram shows the path that a monochromatic ray of light will travel as it passes through air, corn oil, lucite, and back into air?

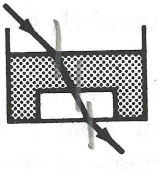
(1)



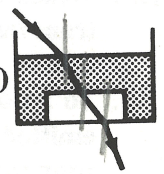
(2)



(3)



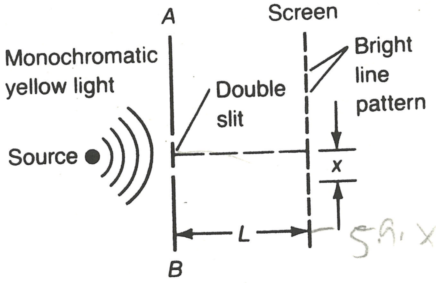
(4)



18. As the index of refraction of an alcohol and water mixture increases, the critical angle for the mixture (1) decreases (2) increases (3) remains the same
19. When the index of refraction of a medium increases, the speed of light through the medium (1) decreases (2) increases (3) remains the same
20. A light ray traveling through glass strikes a glass-air surface. As the angle of incidence increases, the critical angle for the glass (1) decreases (2) increases (3) remains the same
21. As the absolute index of refraction of a substance increases, its critical angle (1) decreases (2) increases (3) remains the same

# PHYSICS 2 CURVED MIRRORS, DIFFRACTION, LENSES TEST

1-5. Base your answers to Questions 1 through 5 on the diagram at right, which shows monochromatic yellow light ($\lambda = 5.9 \times 10^{-7}$ meter) directed upon two narrow slits $1.0 \times 10^{-3}$ meter apart.



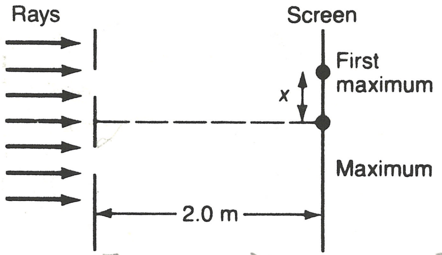
$5.9 \times 10^{-3}$

$\frac{\lambda}{d} = \frac{x}{L}$

1. The first bright line is $5.9 \times 10^{-3}$ meter from the central axis of the pattern. The distance ($L$) between the screen and $AB$ is (1) 1 m (2) 10 m (3) 100 m (4) 1,000 m
2. If the screen is placed 1.0 meter from $AB$, the separation of the central maximum and the first-order bright line ($x$) is (1) $5.9 \times 10^{-6}$ m (2) $2.0 \times 10^{-5}$ m (3) $2.0 \times 10^{-3}$ m (4) $5.9 \times 10^{-4}$ m
3. This double-slit pattern is a result of (1) polarization (2) refraction (3) diffraction (4) dispersion
4. If the separation between the slits is increased, the distance between the bright lines on the screen will (1) decrease (2) increase (3) remain the same
5. If the wavelength of the light incident on the slits is decreased, the separation of the bright lines on the screen will (1) decrease (2) increase (3) remain the same

6-10. Base your answers to Questions 6 through 10 on the following information.

Two parallel slits $2.0 \times 10^{-6}$ meter apart are illuminated by parallel rays of monochromatic light of wavelength $6.0 \times 10^{-7}$ meter, as shown. The interference pattern is formed on a screen 2.0 meters from the slits.



$\frac{6 \times 10^{-7}}{2.0 \times 10^{-6}} = \frac{x}{2}$ $3 \times 10^{1} = \frac{x}{2}$

6. The distance $X$ is (1) $6.0 \times 10^{-1}$ m (2) $6.0 \times 10^{-7}$ m (3) $3.0 \times 10^{-1}$ m (4) 3.3 m
7. The difference between the distances from each of the slits to the first maximum is (1) $\lambda$ (2) $2\lambda$ (3) $\lambda/2$ (4) 0
8. If the wavelength of the light passing through the slits is doubled, the distance from the central maximum to the first maximum (1) decreases (2) increases (3) remains the same

$\frac{\uparrow \lambda}{\uparrow d} = \frac{x \uparrow}{L \downarrow}$

9. If the screen is moved closer to the slits, the distance between the central maximum and the first maximum (1) decreases (2) increases (3) remains the same
10. If the distance between the slits decreases, the distance between the central maximum and the first maximum (1) decreases (2) increases (3) remains the same

(concave converg)

Conv +

11. **Compared to the focal length of a spherical mirror, the radius of curvature of a spherical mirror is (1) one-half as long (2) twice as long (3) the same length (4) four times as long**
12. **Incident rays parallel to the principal axis of a spherical concave mirror are reflected (1) through the center of curvature (2) through the principal focus (3) perpendicular to the principal axis (4) through a point midway between the principal focus and the center of curvature**
13. **Light rays directed toward the center of curvature of a spherical mirror strike the mirror at an angle to the normal of (1) 0° (2) 30° (3) 60° (4) 90°**
14. **The measure of the angle between an incident light ray directed toward the center of curvature of a spherical mirror and its reflected ray is (1) 0° (2) 45° (3) 90° (4) 180°**
15. **Which of the following will cause parallel light rays to converge? (1) concave lens (2) plane mirror (3) concave mirror (4) convex mirror**

16-22. Base your answers to Questions 16 through 22 on the information below.

$\frac{1}{.6} + \frac{1}{x} = \frac{1}{.4}$ $\frac{1}{x} = \frac{1}{1.2}$

An object 0.10 meter tall is placed 0.60 meter in front of a concave mirror having a focal length of 0.40 meter.

16. The radius of curvature of the mirror is (1) 0.20 m (2) 0.40 m (3) 0.80 m (4) 1.2 m

$\frac{S_o}{S_i} = \frac{d_o}{d_i}$ $\frac{.1}{x} = \frac{.6}{1.2}$ $\frac{}{.2}$

17. The image distance is (1) 1.0 m (2) 1.2 m (3) 0.83 m (4) 0.24 m
18. The size of the image is (1) 0.10 m (2) 0.14 m (3) 0.20 m (4) 0.50 m
19. The image produced is (1) real and inverted (2) real and erect (3) virtual and inverted (4) virtual and erect
20. If the object were moved to 0.80 meter from the mirror, the size of the image would be (1) 0.050 m (2) 0.10 m (3) 0.20 m (4) 0.80 m
21. Compared to the size of the object at a distance of 0.80 m from the mirror, the size of the image is (1) less (2) greater (3) the same
22. The object is moved to 0.20 meter from the mirror. Compared to the size of the object, the size of the image is (1) less (2) greater (3) the same

$\frac{S_o}{S_i} = \frac{d_o}{d_i}$ $\frac{.1}{} \frac{.8}{}$ $d_i$ $.2$ $\frac{1}{d_i} + \frac{1}{.8} = \frac{1}{}$